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EXAMINER	
CHEN, WENPENG	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 08/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/801,361	SCHWARTZ ET AL.	
	Examiner	Art Unit	
	Wenpeng Chen	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22, 25, 28, 31* is/are rejected.

7)☒ Claim(s) *23,24,26,27,29 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 May 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *14*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Examiner's responses to Applicant's remark

1. Applicants' arguments filed on 5/24/2004 have been fully considered.

The amendments overcome:

-- the objection to drawings set forth in paper #13;

-- the objection to specification set forth in paper #13;

-- the objection to Claims 16-17 set forth in paper #13;

-- the rejection under 35 U.S.C. 112, second paragraph to Claims 16-17 set forth in paper #13.

2. Applicant's arguments with respect to claims 1, 4, 7, 10, 14, and 18 have been considered but are moot in view of the new ground(s) of rejection due to amendments, as explained in details below.

Drawings

3. The drawings are objected to because:

-- "JPEG 20W" in block 905 of Fig. 9 shall be changed to "JPEG 2000".

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement

sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 10-21 and 31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In paper #13, the examiner rejected Claims 10-21 under 35 U.S.C. 112, first paragraph. The reason is that:

"There is not adequate description to enable a person to follow to make the format conversion without any ambiguity. It is not clear whether the passage teaches that the encoder treats 1 HL, 1 LH and 1 HH coefficients as

zero for all components or just UV components only. To the Examiner, converting a 4:1:1 format to a 4:4:4 format is an up-scaling process in UV components, it cannot be achieved by setting existed, encoded 1 HL, 1 LH and 1 HH coefficients as zero."

Now, the Applicants insert the ***new* teaching** in Claims 10, 14, 18, and 31. This creates a "new matter" issue, because the teaching was not disclosed in the original application.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 4, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Zandi et al. (UK patent Application GB 2303030 listed in IDS paper #6.)

For Claim 7, Zandi teaches an apparatus (page 12, lines 11-24) comprising:

-- means for applying an inverse wavelet transform to data repeatedly for a plurality of decomposition levels during quantization of wavelet coefficients that is performed using a plurality of stages including one or more intermediate stages and a final stage; (Figs. 3A and 3B, Figs. 5A-D; Figs 16-17; *Fig. 14, for example at step 1408, teaches that the inverse wavelet transform is performed using a plurality of stages. For example, when there 3 decomposition levels, there are at least three stages.*)

-- for each of the plurality of decomposition levels, means for clipping, after each application of the inverse wavelet transform during the one or more intermediate stages prior the

final stage, any value generated as a result of application of the inverse wavelet transform that exceeds a predetermined range associated with that decomposition level, subband and inverse wavelet transform. (Fig. 17: page 53, line 8 to page 54, line 11; The output is clipped, for example, to 16 bits that represents a predetermined range of 0 to 2^{16}-1. *The Applicants argued that Zandi merely discloses performing the clipping at the final stage. The Examiner does not agree with this conclusion. As shown in pages 53-54, Fig. 17 teaches an inverse wavelet filter. Nowhere it is said to be limited to the final stage. As step 1408 in Fig. 14 asks "all levels inverse filtered", Fig. 14 teaches using the inverse wavelet filter in every level stage. Therefore, Zandi teaches the amended limitation.*)

The above passages also teach the corresponding method of Claim 1.

Zandi also teaches an article of manufacture comprising one or more recordable media having executable instructions stored thereon which, when executed by the computer to carry out the recited steps of Claim 4. (page 11, lines 11-23)

8. Claims 1, 4, 7, 22, 25, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Keith et al. (US patent 5,966,465 listed in IDS paper #6.)

For Claims 7 and 28, Keith teaches an apparatus (column 5, lines 31-47) comprising:

-- means for applying an inverse wavelet transform to data repeatedly for a plurality of decomposition levels during quantization of wavelet coefficients that is performed using a plurality of stages including one or more intermediate stages and a final stage; (Fig. 3A-3D; column 14, lines 30-52; *Fig. 13, for example at steps 1306-1308, teaches that the inverse wavelet transform is performed using a plurality of stages. For example, when there 3 decomposition levels, there are at least three stages*)

-- for each of the plurality of decomposition levels, means for clipping, after each application of the inverse wavelet transform during the one or more intermediate stages prior the

final stage, any value generated as a result of application of the inverse wavelet transform that exceeds a predetermined range associated with that decomposition level, subband and inverse wavelet transform; (Fig. 3A-3D; column 14, lines 30-52; *Explanation A: "The Applicants argued that Keith merely discloses performing clipping in general. Keith does not teach the amended feature. One reason is that the clipped range is different in different level. The Examiner does not agree with this conclusion. As shown in column 14, lines 30-52 and Fig. 13, Keith teaches an inverse wavelet filter applying to every stage (every decomposition level.) Limiting the decoded values between a maximum value and a minimum value is a clipping process. The claim does not require that the clipping range to be the same for each level. Therefore, Keith teaches the amended limitation".*)

-- wherein each of the plurality of decomposition levels has a predetermined range of values for clipping data after application of a wavelet transform at the respective decomposition level, at least two of the decomposition levels having different predetermined ranges. (Fig. 3A-3D; column 14, lines 30-52; *As shown in column 14, lines 30-52 and Fig. 13, Keith teaches an inverse wavelet filter applying to every stage (decomposition level.) Limiting the decoded values between a maximum and minimum values varies from level to level because a maximum and a minimum values change level by level.*)

The above passage also teaches the corresponding method of Claims 1 and 22.

Keith also teaches an article of manufacture comprising one or more recordable media having executable instructions stored thereon which, when executed by the computer to carry out the recited steps of Claim 4. (column 4, line 66 to column 5, line 15)

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-9, 22, 25, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JPEG2000 N1646 (JPEG2000 image compression standard described in ISO/IEC JTC1/SC29 WG1 N1646, 16 March 2000) in view of Keith et al. (US patent 5,966,465.)

For Claim 7-9, JPEG2000 N1646 teaches an apparatus (section 6.1; decoder) comprising:

-- means for applying an inverse wavelet transform to data repeatedly for a plurality of decomposition levels during quantization of wavelet coefficients that is performed using a plurality of stages including one or more intermediate stages and a final stage; (section 6.3; transform (annex F))

-- wherein the inverse wavelet transform comprises a 5,3 wavelet transform filter; (sections F.2.7, F2.8; Section F.8.1.1 teaches a 5,3 wavelet transform filter.)

-- wherein the inverse wavelet transform comprises a 9,7 wavelet transform filter. (sections F.2.7, F2.8; Section F.8.1.2 teaches a 9,7 wavelet transform filter.)

However, JPEG2000 N1646 does not teach means associated with clipping the recited values.

Keith teaches an apparatus (column 5, lines 31-47) comprising:

-- for each of the plurality of decomposition levels, means for clipping, after each application of the inverse wavelet transform during the one or more intermediate stages prior the final stage, any value generated as a result of application of the inverse wavelet transform that

exceeds a predetermined range associated with that decomposition level, subband and inverse wavelet transform; (Fig. 3A-3D; column 14, lines 30-52; *Also see Explanation A above.)*

-- wherein each of the plurality of decomposition levels has a predetermined range of values for clipping data after application of a wavelet transform at the respective decomposition level, at least two of the decomposition levels having different predetermined ranges. (Fig. 3A-3D; column 14, lines 30-52; *As shown in column 14, lines 30-52 and Fig. 13, Keith teaches an inverse wavelet filter applying to every stage (decomposition level.) Limiting the decoded values between a maximum and minimum values varies from level to level because a maximum and a minimum values change level by level.*)

It is desirable to reduce artifact of reconstructed image data. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Keith's teaching to clip the inverse-wavelet-transformed coefficients generated in an apparatus taught by JPEG2000 N1646, because the combination improves quality of the reconstructed image.

The above passages and combination also teach the corresponding methods of Claims 1-3 and 22.

Because Keith also teaches an article of manufacture comprising one or more recordable media having executable instructions stored thereon which, when executed by the computer to carry out the steps of the corresponding methods (column 4, line 66 to column 5, line 15), the combination also teaches the articles recited in Claims 4-6 and 25.

11. Claims 10-21 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over JPEG2000 N1646 (JPEG2000 image compression standard described in ISO/IEC JTC1/SC29 WG1 N1646, 16 March 2000) in view of Kanou et al. (US patent 6,088,062 cited previously) and Acharya (US patent 6,236,765 cited previously.)

For Claims 14-15 and the interpreted Claims 16-17, JPEG2000 N1646 teaches an apparatus comprising:

-- means for applying a forward wavelet transform to input data having components in a format to generate encoded data; (section 6.1; coder; page 10; section 9)

-- means for quantizing level 1 coefficients in high-low (HL), low-high (LH) and high-high (HH) subbands, such that the encoded data resembles 4:4:4 formatted data. (section J.9; JPEG prefers a 4:4:4 formatted data.)

However, JPEG2000 N1646 does not explicitly teach that the income image data having a 4:x:x format, where x is not equal to 4.

Kanou teaches that images of various formats exist for displaying in various systems and image data needs to be converted from one format to another format. (column 1, lines 1-68) For example, there exist a 4:1:1 format and a 4:2:2 format. (For example, see column 14, lines 12-65.)

It is desirable to be able to produce data stream from image data of various formats into JPEG 2000 format to take the advantage of various utilities provided by the new JPEG 2000 standard. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use the apparatus taught by JPEG2000 N1646 to code image data of a 4:1:1 format and a 4:2:2 format as shown in Kanou, because the combination provides various scalabilities for image data having a 4:1:1 format and a 4:2:2 format.

As taught by JPEG2000 N1646 in section J.9, JPEG prefers a 4:4:4 formatted data. However the combination of JPEG2000 N1646 and Kanou does not teach how to make the forward-wavelet-transformed coefficients derived from into a 4:1:1 format and a 4:2:2 format into a 4:4:4 format.

Acharya teaches:

-- adding a level of coefficients with zero value in all high-low (HL), low-high (LH), and high-high (HH) subbands to double the resolution of the current level in both vertical and horizontal directions. (Figs. 2 and 3; column 5, lines 20-50; *In Fig. 3, all HL, LH, and HH subbands are set to zero.*)

It is desirable to perform the format conversion efficiently. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Acharya's teaching to add level 1 with zero coefficients in all HL, LH, and HH subbands bitstream to generate a 4:4:4 format coded data from a original 4:1:1 format image data in the system taught by the combination of JPEG2000 N1646 and Kanou, because the overall combination performs the format conversion more efficiently. It will be also obvious to one of ordinary skill in the art, at the time of the invention that, for a 4:2:2 format original image data, it only needs to add level 1 with zero coefficients in only HL, and HH subbands bitstream to generate a 4:4:4 format coded data. Please note that " add level 1 with zero coefficients in a subband bitstream" is the same as " quantizing level 1 coefficients in a subband to zero." As discussed above, only the resolution of the two chrominance components needs to be doubled in both the vertical and horizontal directions to convert a 4:1:1 format to a 4:4:4 format. Therefore, the overall combination teaches:

-- quantizing level 1 coefficients in high-low (HL) and high-high (HH) subbands to zero for chrominance components without changing a luminance component of input data, the quantized level 1 coefficients in HL and HH subbands having zero values being used to construct samples of the chrominance components to have a substantially identical format as the

luminance component when generating the encoded data, such that the encoded data resembles 4:4:4 formatted data.

The overall combination thus teaches Claims 14-15 and the interpreted Claims 16-17.

The above passages and combination also teach the corresponding methods of Claims 10-13.

JPEG2000 N1646 teaches executable instructions, executed by the computer to carry out the steps recited in the method claims. (procedures in section 6.1 and software in annex J.) It is inherently that there are recordable media that store the procedure or software in the encoder and decoder. Otherwise, the encoder or decoder cannot function. Therefore, the overall combination also teaches the article of manufacture recited in Claims 18-20.

With the above citations and reasoning, the combination of JPEG2000 N1646, Kanou, and Acharya also teaches the method of Claim 31.

Allowable Subject Matter

12. Claims 23-24, 26-27, and 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter. The prior art fails to teach the method of Claim 23, the article of Claim 26, and the apparatus of Claim 29 which specifically comprise the following feature in combination with other limitations associated the claims:

-- after the inverse wavelet transform for 8-bit input samples, ***clipping low-pass coefficients*** *exceeding the respective predetermined range* ***to a value ranging from approximately -191 to 191.***

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 703 306-2796. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703 308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 703-306-0377.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-4700.

Wenpeng Chen
Examiner
Art Unit 2624

August 20, 2004